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Description

This invention relates to an expandable and collapsible window covering of the Roman shade type wherein one side of the shade, typically arranged so that this side is toward the interior of the room, consists of a number of horizontal parallel curved surfaces, and in which each of these curved surfaces forms the front wall of a tubular cell extending transversely across the width of the shade, thus creating a thermal insulating window covering with an extremely attractive appearance.

Several publications show cellular shades, wherein a fabric material is formed to define parallel tubular cells extending horizontally across the width of the shade. Air within each of the cells only circulates minimally, such that, when expanded, the shade provides good thermal insulation.

It is, of course, desirable to make the shade as physically attractive as possible and as economically as possible, by using little material to form each cell and that making the manufacturing process be as expeditious as possible.

Prior art disclosures include NE-A-6706563, wherein a plurality of strips of a fabric material are folded about fold lines extending longitudinally and bonded together, the two edges of each strip being bonded to the centre of the next successive strip, to form a screen consisting of a plurality of vertically extending tubular cells.

US-A-4347887 shows a "thermal shutter" in which a wide band of material is folded transversely to form a double column of adjacent cells, which may have rounded visible contours. The cells are adhesively bonded to one another in such a way that both sides of the shade have essentially the same appearance.

US-A-4450027 shows a method and apparatus for fabricating a multiple cell shade wherein a continuous relatively narrow strip of fabric is folded longitudinally in order to define pleats in the shade material and the edges folded over on the centre portion to create a tubular cell. Successive cells are assembled by applying an adhesive to folded over edges of the cells, and adhering each cell to the preceding cell when wound on a stacking rack.

US-A-4631217 shows in Figure 3 a shade of asymmetrical construction. A rear wall section of each cell is essentially straight when the shade is in its expanded position. The width of these rear wall sections thus defines the spacing of the adjacent cells, while the front of each cell, containing more material, presents a pleated outward appearance. The shade is formed from a material folded into a Z-shape rather than from a U-shape as shown in US-A-4450027.

US-A-4846243 shows a foldable window covering formed of a wide material folded transversely, to

yield a collapsible shade. The front surface of the shade consists of a number of drooping loops formed by doubling the material back on itself. The successive cells are spaced in the expanded position of the shade by a relatively vertical rear wall section of each cell.

Roman shades are often preferred by consumers for their smooth and uncreased but drooping appearance to the room interior. While the disclosures cited above provide shades which may be commercially producible in relatively high volume, only US-A-4846243 shows a Roman shade type shade. However, the shade is formed of a wide strip of material folded transversely, which limits the width of the shade which can be formed to the width of the stock material available. Also, the application of adhesive lines in the transverse direction on fabrics is problematic in that straight lines are difficult to achieve. A significant drawback to traditional Roman shades is that they generally must be jobbed out to seamstresses and take significantly longer and often cost more to make than the various pleated shades disclosed above.

US-A-2201356 discloses an expandable and collapsible window covering, comprising an expandable and collapsible pleated panel and a flexible sheet attached to the pleated panel transversely across the width of said panel at longitudinal, periodically spaced intervals with respect to the pleats of said panel to form a plurality of stacked, transverse closed cells, the longitudinal direction of the individual cells being the transverse direction of the window covering, the length of fabric sheet between adjacent points of attachment being greater than the longitudinal spacing of said points of attachment with the window covering in the expanded condition. According to one aspect of the invention such a structure is characterised in that said flexible sheet is an unpleated sheet and is attached to the pleated panel, so that it smoothly curves from one attachment point to beyond an adjacent attachment point below in the expanded condition.

Such a structure forms a Roman shade consisting of a number of parallel generally tubular cells, each having a front wall formed of a relatively drooping soft material which is essentially uncreased in the finished product, providing an aesthetically pleasing appearance, while the rear wall of each cell is essentially linear when the shade is in the expanded state, such that the width of the rear wall determines the spacing of adjacent cells and holds the front wall from being pulled flat. These Roman shades can be easily adapted to the use of custom fabrics and can be manufactured using essentially automated methods and apparatus.

EP-A-431937 discloses a method of making an expandable and collapsible window covering, said method comprising providing an expandable and col-

lapsible pleated panel having a first side and a second side from which said pleats project. According to a second aspect of the invention, such a method is characterised in attaching an unpleated flexible facing sheet to one of said first and second sides of said pleated panel at periodically spaced attachment points, with the length of facing sheet attached between adjacent attachment points being greater than the distance between said attachment points when said panel is expanded.

In order that the present invention may more readily be understood, the following description is given, merely by way of example, reference being made to the accompanying drawings in which:-

Figure 1 is an elevational view of an apparatus for forming one embodiment of window covering of the present invention;

Figure 2 is a perspective view of the initial creasing assembly of the apparatus shown in Figure 1;

Figure 3 is a cross-sectional view of a folding roller of the apparatus shown in Figure 1;

Figure 4 is a cross-sectional view of a folding die of the apparatus shown in Figure 1;

Figure 5 shows a perspective view of the portion of the apparatus of Figure 1 for application of adhesive to form the cellular structure;

Figure 6 shows a perspective view of a layered cellular structure being separated into two pleated panel base materials according to the present invention;

Figure 7 is a schematic diagram illustrating the step of bonding the facing material to the base material according to the present invention;

Figure 8 is a partial perspective end view of one embodiment of finished Roman shade according to the present invention;

Figure 9 is a front elevational view of the shade of Figure 8; and

Figures 10, 11 and 12 are each an end view of three further embodiments of Roman shade according to the present invention.

Expandable and collapsible window coverings of the present invention are produced by utilizing and adding to the methods disclosed in US-A-4450027 the disclosure of which is incorporated herein by reference. Additional steps of the present invention may include applying additional longitudinal hot-melt glue lines, cutting the cellular shade obtained thereby into two single pleated panels to form a base material and attaching a fabric face to the base material.

Figure 1 through 5 illustrate steps used in US-A-4450027 as well as part of the additional apparatus and method steps necessary for the present invention. A continuous strip of material 10 is drawn through a series of steps which result in its edges 12 being folded over the central portion 13, so that they approach each other closely near the middle of the strip. As Figure 2 shows, a creaser assembly 11 in-

cludes a pair of spaced-apart creaser wheels 14 that are pressed against strip material 10 as it is drawn around a roller 16. The creaser wheels are mounted on an axle 17 which is itself mounted on a pivotal arm assembly 18, and are kept pressed against the shade material 10 by a spring 19 which exerts force against the arm assembly, to form folds along crease lines 15.

After creasing, the material 10 is drawn around roller 20 (Figure 3 and 4) and through folding die 22 to fold over the edges 12 of strip material 10.

Once folded, an adhesive applicator assembly 30 (Figure 1) applies adhesive to the strip material in order to subsequently bond layers of the folded strip material together. As shown in Figure 5, as the strip material 10 is drawn around a roller 32, adhesive material is dispensed in beads 31 from an applicator 34 onto the material 10. Motor driven belts 36 may be used to drive the roller 32 to assist in drawing the shade material 10. Preferably, the adhesive is dispensed at a rate proportional to the speed at which the shade material 10 is drawn past, so that a like amount of adhesive is applied regardless of the manufacturing rate. Two beads 31 of the adhesive are continuously dispensed, one each adjacent to the edges 12 of the shade material 10. The strips of material 10 are then stacked by winding on rotating rack 33. The width of adhesive beads 31 may be adjusted as necessary to achieve an adequate bead in a particular application.

In addition to the adhesive applicator assembly 30, disclosed in US-A-4450027, the present invention utilizes a hot-melt adhesive applicator assembly 70. Nozzles 72 apply two beads 74 of hot-melt adhesive to the folded strip material 10, outside adhesive beads 31. The hot-melt adhesive beads 74 quickly harden so that when the material 10 is subsequently stacked hot-melt adhesive beads 74 do not bond together adjacent fabric layers.

The hot-melt adhesive is initially provided in hopper 76, shown in Figure 1, in the form of pellets which fall into cylinder 78 in which a piston is pneumatically powered to force the pellets into heating block 80 where they are melted. Contained within block 80 is a second positive displacement gear pump for pumping the melted hot-melt adhesive to nozzles 72 at a constant rate relative to the strip material 10 speed.

In order to prevent yellowing of the hot-melt adhesive, which can occur from remaining in a melted state for prolonged periods, only a small amount of adhesive is melted by heating block 80 just before it is applied. An electric heating element 82 provides the heat necessary to melt the adhesive. A preferred adhesive for this application is copolyester hot-melt adhesive which melts at 121°C.

After the application of adhesive materials, the shade material 10 is stacked, by winding on rotating elongate rack 33, so that the folded edge portions 12

of one strip are adhesively bonded by adhesive beads 31 to the central portion 13 of the next strip. The stacked assembly of strips thus curves around the ends of the rack. When the stack is complete, the curved ends of the stack are cut off, leaving two cellular structures one on each side of the rack.

As shown in Figure 6 the stacked material is cut longitudinally down its central portion 13, between the folded side portions 12 yielding two pleated panel base materials 40. A preferred method of cutting the cellular stack 42 to obtain the two panels employs a rotating, circular knife blade 44. However, any basic cutting tool can be used, even a simple hand-held knife. These pleated panels may then be used as a base material for the Roman shades according to the present invention.

Figure 7 illustrates the attachment of the facing fabric 86 to the pleated panel base material 40. The base material 40 is expanded and fed over a back-up bar 88. The facing fabric 86 is fed from a supply roll to a position adjacent the base material 40. When the appropriate amount of facing fabric 86 has been fed to create the loops 90 which provide the characteristic droopy appearance of the Roman shade, a heat seal bar 92 moves forward to press the facing fabric 86 against the hot-melt adhesive bead 74 and create an adhesive bond. Loops 90 may be formed by feeding the facing fabric at a slightly faster rate than the base material 40. The combined temperature and pressure exerted by the heat seal bar 92 melts adhesive bead 74 and forces it into the fibres of facing fabric 86 to create a secure bond. The heat seal bar 92 is then removed and hot-melt adhesive bead 74 quickly hardens permanently to bond together the base material 40 and facing fabric 86.

Arrows 93 in Figure 7 indicate the direction of travel of the base material 84 and facing fabric 86. If the size of the loops 90 desired is large it may be necessary to feed both materials upside down from their normal orientation as a Roman shade as illustrated in Figure 7. This causes the loops 90 to fall naturally out of the way of the bond areas at adhesive beads 74. It should be readily appreciated by those skilled in the art that the heat seal bar 92 may be fully automated or, alternatively, may be a hand held and operated device.

Furthermore, the hot-melt adhesive method of bonding this facing fabric 86 to the base material 40 is only a preferred embodiment of the present invention. The facing fabric 86 could also be fastened to the base material 40 by other means such as a clip system attached to the base material or simply by sewing the two layers together.

A finished Roman shade according to the present invention is shown in Figure 8 and 9. Holes 94 have been provided for the passage of a lift cord 96 through the base material 40. The number of lift cords 96 required for a particular shade will depend upon

the shade width. The base material 40 forms a pleated panel which is the back of the shade. The facing fabric 86 provides a smooth, droopy appearance for the front of the shade. Transverse cells 98 are defined by the facing fabric 86 and the base material 84, bonded together at the hot-melt adhesive beads 74 above and below each cell 98.

Individual cells 98 comprise a front wall 99 and a rear wall 100 which has three portions: a first portion 102 is joined to a second, middle portion 104 by rearwardly directed pleat 106 and third portion 108 is joined to the second, middle portion 104 by a forwardly directed pleat 110. It can be seen that first portion 102 and third portion 108 of the cell below are integral with one another and separated only by hot-melt adhesive beads 74 which define the extend of the rear wall of each cell. When fully expanded, the rear wall 100 of each cell 98 is essentially vertical and remains of shorter height than the cell front wall 99 formed by the facing fabric 86. Therefore, even in the fully expanded position, the shade maintains its characteristic droopy front appearance. Transverse cells 98 also provide excellent insulating properties for the Roman shade according to the present invention. To complete the shade, a head rail 112 and bottom rail 114 are added as shown in Figure 9.

Figures 10, 11 and 12 illustrate alternative embodiments of a window covering according to the present invention. The embodiment illustrated in Figure 10 is substantially the same as in Figure 8 except that it is inverted in deployment. Therefore the general arrangement of cells 98 with respect to front wall 99, rear wall 100 and first, second and third rear wall portions 102, 104 and 108 is the same as explained above with respect to Figure 8.

Figure 11 illustrates an embodiment in which the facing fabric 86 is attached to the pleated panel base material 40 at periodically varied intervals in order to provide first and second transverse cells 98a, 98b of different size in the longitudinal direction of the window covering. To create this embodiment a second hot-melt adhesive bead 74a is applied to the flat tubular material on the opposite side from the first hot-melt adhesive bead 74. Cells of the first type 98a are formed by attaching facing fabric 86 to both adhesive beads 74 and 74a on the associated pleated panel section. This provides first cells 98a with only an inwardly directed pleat 110. Cells of the second type 98b thus have one inwardly directed pleat 110 and two outwardly directed pleats 106. Adhesive beads 74' and 74a' remain unused.

Figure 12 illustrates an embodiment of the present invention having relatively larger cells 98c, formed on the same base material 40 as in the previous embodiments. To form the embodiment shown in Figure 12, every other adhesive bead 74' is skipped in the attachment of facing fabric 86. This provides each cell 98c with two inwardly directed pleats

110 and two outwardly directed pleats 106. It should be apparent that additional adhesive beads may be skipped to provide even larger cells as desired.

An important aspect of the present invention is the ease with which custom Roman shades can be made. The cellular structure from which the base material 40 is made need not be made in any particular size because the base material is cut from it to suit the particular window to be covered. Therefore, the cellular structure may be produced in relatively large widths, limited only by the size of rotating rack 33, to provide efficient, high volume production. Also, using the same base material 40, a fabricator may choose from a wide range of facing fabrics 86 because no special preparation of the facing fabric is required.

Claims

1. An expandable and collapsible window covering, comprising an expandable and collapsible pleated panel (40) and a flexible sheet (86) attached to the pleated panel transversely across the width of said panel at longitudinal, periodically spaced intervals (74) with respect to the pleats (110) of said panel (40) to form a plurality of stacked, transverse closed cells (98), the longitudinal direction of the individual cells being the transverse direction of the window covering, the length of fabric sheet (86) between adjacent points of attachment being greater than the longitudinal spacing of said points of attachment with the window covering in the expanded condition, characterised in that the flexible sheet (86) is an unpleated sheet and is attached to the pleated panel, so that it smoothly curves from one attachment point to beyond an adjacent attachment point below in the expanded condition. 20
2. A window covering according to claim 1, characterised in that said transverse cells (98) each comprise a rear wall (100) having a first portion (102) joined to a second, middle portion (104) by a pleat (106) directed outwardly with respect to the cell and a third portion (108) joined to the second, middle portion by a pleat (110) directed inwardly with respect to the cell, and a front wall (99) comprised of said fabric sheet having an unpleated, drooping outer appearance. 30
3. A window covering according to claim 1, characterised in that it includes alternately repeating first and second transverse cells, said first transverse cells (98a) each comprise a rear wall comprised of said pleated panel and having only one pleat (106) directed outwardly with respect to said pleat (110) and one said first cell, and a front wall (86) comprised of said fabric sheet having an 35
4. A window covering according to claim 1, 2 or 3, characterised in that said expandable and collapsible pleated panel comprises a stack of longitudinally folded strips bonded one on top of another, said longitudinal folds (110) forming transverse pleats of said pleated panel, and in that said longitudinal folds are sharp, permanently set and creased folds. 40
5. A window covering according to any preceding claim, characterised in that it further comprises a head rail (112) attached to said pleated panel and unpleated fabric at a top end; a bottom rail (114) attached to said pleated panel and unpleated fabric at a bottom end; and means (96) for raising and lowering said bottom rail and thereby the pleated panel and unpleated fabric. 45
6. A method of making an expandable and collapsible window covering, said method comprising providing an expandable and collapsible pleated panel (40) having a first side and a second side from which the pleats project, characterised by attaching an unpleated flexible facing sheet (86) to one of said first and second sides of said pleated panel at periodically spaced attachment points (74), with the length of facing sheet (86) attached between adjacent attachment points being greater than the distance between said attachment points when said panel is expanded. 50
7. A method according to claim 6, characterised in that the attachment of the facing fabric is continuous across the width of the pleated panel, thereby forming a plurality of stacked, closed transverse cells. 55
8. A method according to claim 6 or 7, characterised in that the step of providing a pleated panel comprises providing a continuous flat material having longitudinal edge folds (12) and a longitudinal central portion (13) between said folds, applying a first adhesive material (31) to said material longitudinally along said central portion (13), stacking the continuous tubular material to form a stack of adjacent layers of said tubular material, allowing said first adhesive material to adhere one layer to another to form a unitary stack, and cutting a section of the unitary stack away from 60

unpleated, drooping outer appearance and said second transverse cells (98b) each comprise a rear wall comprised of said pleated panel and including one pleat (110) directed inwardly with respect to said second cell and two pleats (106) directed outwardly with respect to said second cell, and a front wall comprised of said fabric sheet having an unpleated, drooping outer appearance.

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the remainder of the stacked tubular material to form a pleated panel.

9. A method according to claim 8, characterised in that the continuous flat material is continuously folded from a continuous length of flat strip material at diametrically opposite sides into a flat tubular or near tubular form and in that the continuous folds are permanently set and creased by heat treating and cooling the flat tubular material under constant pressure and tension. 5

10. A method according to claim 8 or 9, further comprising cutting the cut away section of tubular material longitudinally along the centre of the tubular layers to create two panels of single pleated material prior to attaching the flat facing fabric. 10 15

11. A method according to claim 10, characterised by applying a second, hot-melt adhesive material in at least one bead (74) spaced outwardly from said first adhesive material (31). 20

12. A method according to claim 11, characterised in that the step of attaching flat facing fabric comprises the steps of expanding and feeding one single pleated panel (40) over a support member at a first rate, said member (88) being positioned on the opposite side of the panel from the bead of hot-melt adhesive (74), feeding a flat facing fabric (86) at a second rate greater than said first rate, with said fabric fed adjacent the pleated panel on the same side as the bead of hot-melt adhesive, and bonding the flat facing fabric to the pleated panel by pressing the facing fabric, the pleated panel and said hot-melt adhesive bead between the support member and a moveable heated member (92). 25 30 35 40

nannten Befestigungspunkte bei auseinandergezogener Fensterabdeckung ist, dadurch gekennzeichnet, daß das flexible Flächengebilde (86) selbst keine Preßfaltung aufweist und an der preßgefalteten Tafel so befestigt ist, daß es im auseinandergezogenen Zustand der Fensterabdeckung in glattem Bogen von einem Befestigungspunkt bis unter den nächsten darunterliegenden Befestigungspunkt herabhängt.

2. Fensterabdeckung gemäß Anspruch 1, dadurch gekennzeichnet, daß die in Querrichtung verlaufenden Zellen (98) jeweils über eine Rückwand (100) mit einem ersten Teil (102) verfügen, der über eine relativ zu der Zelle auswärts gerichtete Preßfalte (106) mit einem zweiten, mittleren Teil (104) verbunden ist, wobei ein dritter Teil (108) über eine relativ zu der Zelle einwärts gerichtete Preßfalte (110) mit diesem zweiten, mittleren Teil verbunden ist, und diese Zellen ferner über eine Vorderwand (99) aus dem genannten textilen Flächengebilde verfügen, das ein nicht preßgefaltetes, lose herabhängendes Äußeres aufweist.

3. Fensterabdeckung gemäß Anspruch 1, dadurch gekennzeichnet, daß diese eine abwechselnde Folge von ersten und zweiten Querzellen umfaßt, wobei die ersten Querzellen (98a) jeweils eine Rückwand, die aus der preßgefalteten Tafel mit einer relativ zu der vorgenannten Preßfalte (110) und zu einer dieser ersten Zellen nach außen gerichteten Preßfalte (106) besteht, sowie eine Vorderwand (86) aus dem textilen Flächengebilde mit dem nicht preßgefalteten, locker herabhängenden Äußeren aufweisen und die zweiten Querzellen (98b) über jeweils eine Rückwand, die aus der preßgefalteten Tafel mit einer relativ zu dieser zweiten Zelle nach innen gerichteten Preßfalte (110) und zwei relativ zu dieser zweiten Zelle nach außen gerichteten Preßfalten (106) besteht, sowie ebenfalls eine Vorderwand aus dem textilen Flächengebilde mit dem nicht preßgefalteten, locker herabhängenden Äußeren aufweisen.

4. Fensterabdeckung gemäß einem der Ansprüche 1, 2 oder 3, dadurch gekennzeichnet, daß die auseinanderziehbare und zusammenlegbare preßgefaltete Tafel eine Anordnung übereinanderliegender, längsgefalteter Streifen umfaßt, die aufeinandergeklebt sind, wobei diese Längsfalten (110) die in Querrichtung verlaufende Preßfaltung der preßgefalteten Tafel darstellen und es sich bei diesen Längsfalten um scharfe, dauerhaft eingeförmte und quetschgefaltete Falten handelt.

Patentansprüche

1. Auseinanderziehbare und zusammenlegbare Fensterabdeckung, die eine auseinanderziehbare und zusammenlegbare, preßgefaltete Tafel (40) sowie ein flexibles Flächengebilde (86) umfaßt, das an dieser preßgefalteten Tafel quer über deren Breite in regelmäßigen Längsabständen (74) relativ zu den Preßfalten (110) der Tafel (40) befestigt ist, so daß sich mehrere übereinander angeordnete und in Querrichtung verlaufende, geschlossene Zellen (98) ergeben, wobei die Längsrichtung der einzelnen Zellen mit der Querrichtung der Fensterabdeckung identisch ist und die Länge des textilen Flächengebildes (86) zwischen nebeneinanderliegenden Befestigungspunkten größer als der Längsabstand der ge-

5. Fensterabdeckung gemäß einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß diese zudem über eine oben an der preßgefalteten Tafel sowie dem nicht preßgefalteten textilen Flächengebilde befestigte Kopfschiene (112), eine unten an der preßgefalteten Tafel sowie dem nicht preßgefalteten textilen Flächengebilde befestigte Fußschiene (114) sowie außerdem Mittel (96) zum Anheben und Absenken der genannten Fußschiene und damit auch zum Anheben und Absenken der preßgefalteten Tafel sowie des nicht preßgefalteten Flächengebildes verfügt.

6. Verfahren zur Herstellung einer auseinanderziehbaren und zusammenlegbaren Fensterabdeckung unter Beistellung einer auseinanderziehbaren und zusammenlegbaren preßgefalteten Tafel (40) mit einer ersten und einer zweiten Seite, von der die Preßfalten vorstehen, dadurch gekennzeichnet, daß ein nicht preßgefaltetes, flexibles Verkleidungsflächengebilde (86) an in regelmäßigen Abständen vorgesehenen Befestigungspunkten (74) an einer der genannten ersten und zweiten Seiten der preßgefalteten Tafel so angebracht wird, daß die zwischen benachbarten Befestigungspunkten befindliche Länge des Verkleidungsflächengebildes (86) größer als der Abstand zwischen diesen Befestigungspunkten bei auseinandergesetzter Tafel ist.

7. Verfahren gemäß Anspruch 6, dadurch gekennzeichnet, daß das Verkleidungsflächengebilde über die Breite der preßgefalteten Tafel hinweg durchgehend befestigt wird, so daß sich eine Mehrzahl übereinander angeordneter, geschlossener Querzellen ergibt.

8. Verfahren gemäß einem der Ansprüche 6 oder 7, dadurch gekennzeichnet, daß der Schritt der Beistellung einer preßgefalteten Tafel die Bereitstellung eines fortlaufenden flachen Materials mit in Längsrichtung verlaufenden Randfalten (12) sowie einem zwischen diesen Falten ebenfalls in Längsrichtung verlaufenden Mittelteil (13), den Auftrag eines ersten Klebstoffs (31) in Längsrichtung entlang dem Mittelteil (13) des vorgenannten Materials, das Stapeln des fortlaufenden röhrenförmigen Materials zu einer übereinanderliegenden Anordnung angrenzender Lagen dieses röhrenförmigen Materials, das Aushärtenlassen des ersten Klebers zwecks Verklebung der Lagen zu einem geschlossenen Stapel sowie das Abschneiden eines Stücks dieses geschlossenen Stapels von dem verbleibenden Stapel röhrenförmigen Materials zwecks Herstellung einer preßgefalteten Tafel umfaßt.

9. Verfahren gemäß Anspruch 8, dadurch gekennzeichnet, daß das fortlaufende flache Material aus einem fortlaufenden Abschnitt eines flachen Streifenmaterials durch fortlaufende Faltung an diametral entgegengesetzten Seiten zu einer flachen, zumindest annähernd röhrenförmigen Form verarbeitet wird, und die durchlaufenden Falten durch Wärmebehandlung und Abkühlung des flachen röhrenförmigen Materials unter konstantem Druck und konstanter Spannung dauerhaft eingeformt und quetschgefaltet werden.

10. Verfahren gemäß einem der Ansprüche 8 oder 9, bei dem überdies im Trennbereich des röhrenförmigen Materials ein Längsschnitt entlang der Mitte der röhrenförmigen Lagen durchgeführt wird, um zwei Tafeln einfachen preßgefalteten Materials zu bilden, bevor das flache Verkleidungsflächengebilde angebracht wird.

11. Verfahren gemäß Anspruch 10, dadurch gekennzeichnet, daß ein Heißkleber als zweiter Klebstoff in Form mindestens einer Raupe (74) aufgebracht wird, und zwar außerhalb des vorgenannten ersten Klebstoffs (31) und in einem Abstand zu diesem.

12. Verfahren gemäß Anspruch 11, dadurch gekennzeichnet, daß der Schritt der Befestigung des flachen Verkleidungsflächengebildes das Auseinanderziehen und die Zufuhr einer einzelnen preßgefalteten Tafel (40) über ein an der der Heißkleber-Raupe (74) entgegengesetzten Tafelseite angeordnetes Stützelement (88) mit einer ersten Geschwindigkeit, die Heranführung eines flachen Verkleidungsflächengebildes an die gefaltete Tafel (86) auf der Seite der Heißkleber-Raupe mit einer gegenüber dieser ersten Geschwindigkeit erhöhten zweiten Geschwindigkeit sowie das Verkleben der flachen Verkleidungsflächengebildes mit der preßgefalteten Tafel durch Zusammenpressen des Verkleidungsflächengebildes, der gefalteten Tafel sowie der vorgenannten Heißkleberraupe zwischen dem Stützelement und einem beweglichen Heizglied (92) umfaßt.

Revendications

50. 1. Couverture de fenêtre extensible et repliable comprenant un panneau plissé extensible et repliable (40) et une feuille souple (86) fixée au panneau plissé transversalement à travers la largeur dudit panneau à des intervalles longitudinaux et régulièrement espacés (74) par rapport aux plis (110) dudit panneau (40) pour former une pluralité de cellules transversalement fermées et empilées (98), la direction longitudinale des cel-

lules individuelles étant la direction transversale de la couverture de fenêtre, la longueur de feuille de tissu (86) entre des points de fixation adjacents étant supérieure à l'espacement longitudinal desdits points de fixation, la couverture de fenêtre se trouvant dans la condition dépliée, caractérisée en ce que la feuille souple (86) est une feuille non plissée et en ce qu'elle est fixée au panneau plissé, de sorte qu'elle s'incurve uniformément depuis un premier point de fixation jusqu'à un point situé au-delà du point de fixation adjacent en-dessous, dans la condition dépliée.

2. Couverture de fenêtre selon la revendication 1, caractérisée en ce que lesdites cellules transversales (98) comprennent chacune une paroi arrière (100) comprenant une première partie (102) réunie à une seconde partie médiane (104) par un pli (106) orienté vers l'extérieur par rapport à la cellule et une troisième partie (108) réunie à la seconde partie médiane par un pli (110) orienté vers l'intérieur par rapport à la cellule et une paroi avant (99) constituée de ladite feuille de tissu présentant un aspect non plissé pendant vers l'extérieur.

3. Couverture de fenêtre selon la revendication 1, caractérisée en ce qu'elle comprend des première et seconde cellules transversale en répétition alternée, lesdites premières cellules transversales (98a) comprenant chacune une paroi arrière constituée dudit panneau plissé et ayant un seul pli (106) orienté vers l'extérieur par rapport audit pli (110) et l'une de ladite première cellule et d'une paroi avant (86) constituée de ladite feuille de tissu présentant un aspect non plissé pendant vers l'extérieur et lesdites secondes cellules transversales (98b) dont chacune comprend une paroi arrière constituée dudit panneau plissé comprenant un premier pli (110) orienté vers l'intérieur par rapport à ladite seconde cellule et deux plis (106) orientés vers l'extérieur par rapport à ladite seconde cellule ainsi qu'une paroi avant constituée de ladite feuille de tissu présentant un aspect non plissé pendant vers l'extérieur.

4. Couverture de fenêtre selon la revendication 1, 2 ou 3, caractérisée en ce que ledit panneau plissé extensible et repliable comprend une pile de bandes repliées dans le sens longitudinal collées l'une au sommet de l'autre, lesdits replis longitudinaux (110) formant des plis transversaux dudit panneau plissé et en ce que lesdits plis longitudinaux sont des replis pointus, établis de façon permanente et froncés.

5. Couverture de fenêtre selon l'une quelconque des revendications précédentes, caractérisée en

ce qu'elle comprend en outre un rail supérieur (112), fixé audit panneau plissé et au tissu non plissé à une extrémité supérieure, un rail inférieur (114) fixé audit panneau plissé et au tissu non plissé à une extrémité inférieure et un moyen (96) pour éléver et abaisser ledit rail inférieur et ainsi le panneau plissé ainsi que le tissu non plissé.

6. Procédé de fabrication d'une couverture de fenêtre extensible et repliable, ledit procédé comprenant la fourniture d'un panneau plissé extensible et repliable (40) comportant un premier côté et un second côté desquels dépassent les plis, caractérisé par la fixation d'une feuille frontale souple non plissée (86) sur l'un desdits premier et second côtés dudit panneau plissé à des points de fixation régulièrement espacés (74), la longueur de la feuille frontale (86) fixée entre des points de fixation adjacents étant supérieure à la distance séparant lesdits points de fixation lorsque ledit panneau est déplié.

7. Procédé selon la revendication 6, caractérisé en ce que la fixation du tissu frontal est continue à travers la largeur du panneau plissé, formant ainsi une pluralité de cellules transversales fermées et empilées.

8. Procédé selon la revendication 6 ou 7, caractérisé en ce que l'étape consistant à fournir un panneau plissé comprend la fourniture d'un matériau plat continu comprenant des bords longitudinaux repliés (12) et une partie centrale longitudinale (13) entre lesdits replis, appliquer une première matière adhésive (31) sur ledit matériau dans le sens longitudinal suivant ladite partie centrale (13), empiler le matériau tubulaire continu pour former une pile de couches adjacentes dudit matériau tubulaire, la mise de ladite première matière adhésive en adhérence d'une couche sur une autre pour former une pile unitaire et à découper une section de la pile unitaire du reste de matériau tubulaire empilé pour former un panneau plissé.

9. Procédé selon la revendication 8, caractérisé en ce que le matériau plat continu est replié en continu à partir d'une longueur continue de matériau de bande plate à des côtés diamétriquement opposés en une forme tubulaire plane ou forme tubulaire voisine et en ce que les replis continus sont établis en permanence et froncés par traitement à chaud et à refroidir le matériau tubulaire plat sous pression et tension constantes.

10. Procédé selon la revendication 8 ou 9, comprenant en outre la découpe de la section de matériau tubulaire dans le sens longitudinal suivant le

centre des couches tubulaires pour créer deux panneaux de matériau plissé simple avant de fixer le tissu frontal plat.

11. Procédé selon la revendication 10, caractérisé par l'application d'une seconde matière adhésive fondu à chaud dans au moins un cordon (74) séparé vers l'extérieur de ladite première matière adhésive (31). 5

12. Procédé selon la revendication 11, caractérisé en ce que l'étape consistant à fixer le tissu frontal plat comprend les étapes de repliement et de distribution d'un premier panneau plissé simple (40) sur un élément de support à une première vitesse, ledit élément (88) étant positionné sur le côté opposé du panneau par rapport au cordon adhésif fondu à chaud (74), à distribuer un tissu frontal plat (86) à une seconde vitesse supérieure à ladite première vitesse, ledit tissu distribué étant adjacent au panneau plissé sur le même côté que le cordon d'adhésif fondu à chaud et coller le tissu frontal plat sur le panneau plissé en pressant le tissu frontal, le panneau plissé et ledit cordon adhésif fondu à chaud entre l'élément de support et un élément chauffé mobile (92). 10
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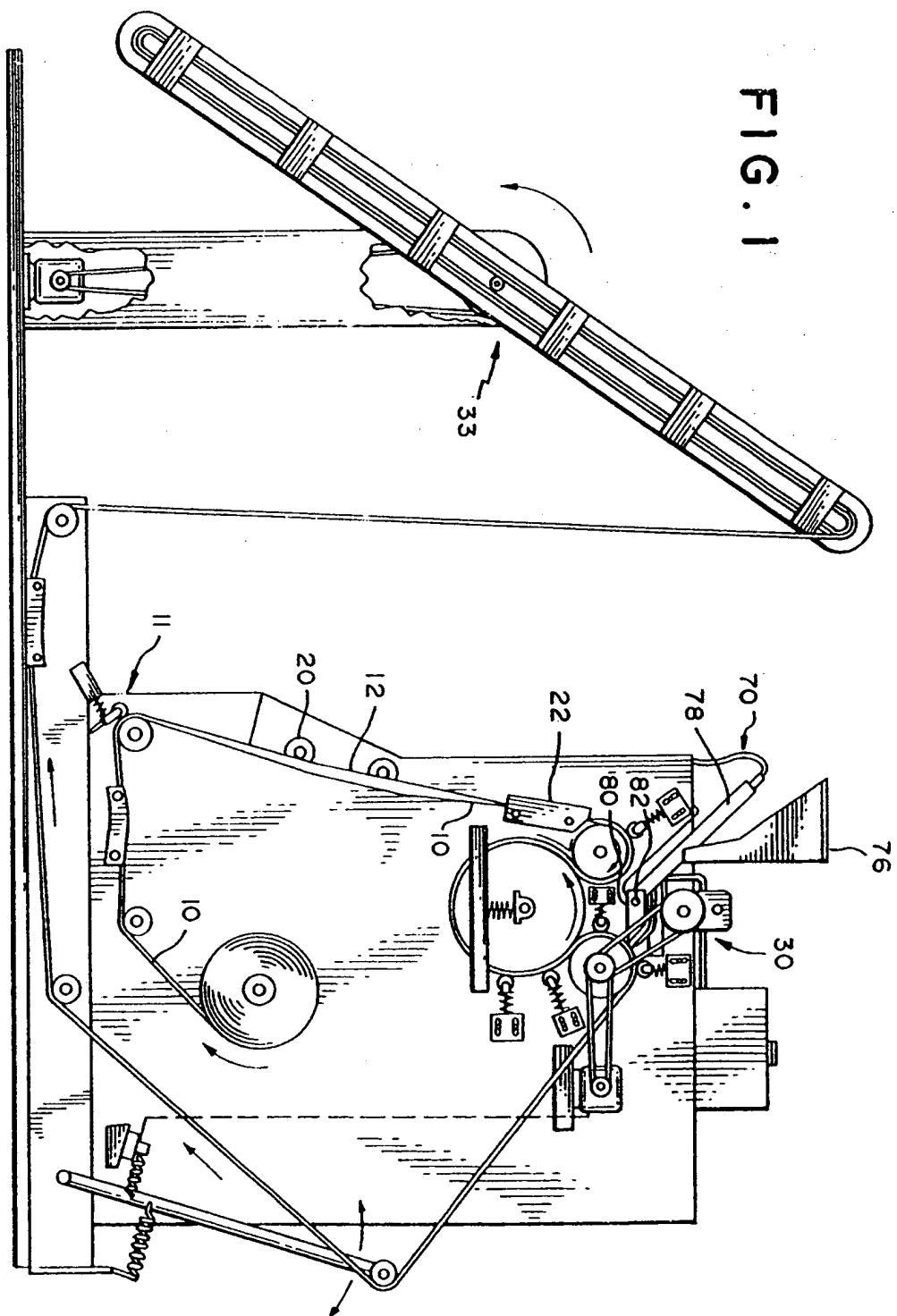
40

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FIG. 1



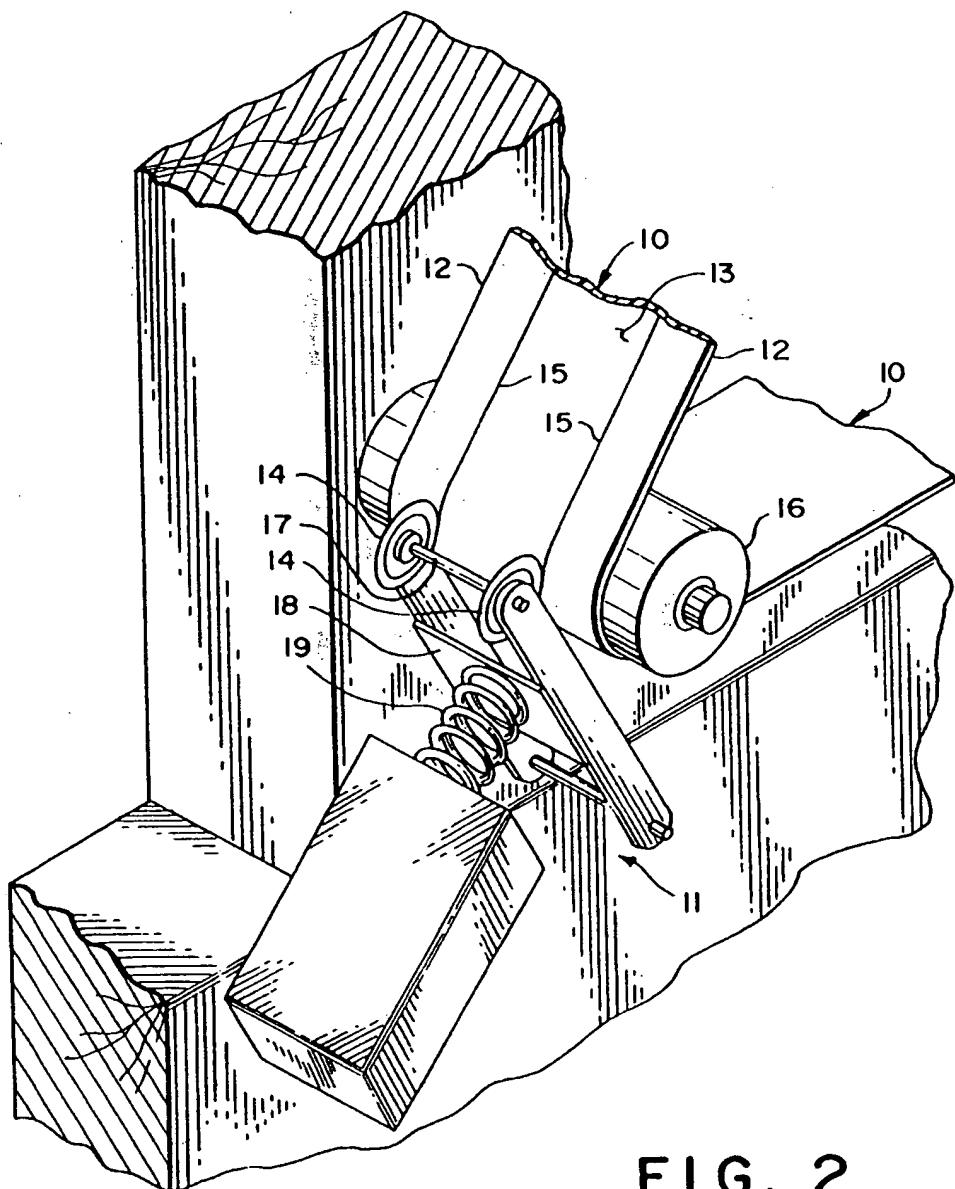


FIG. 2

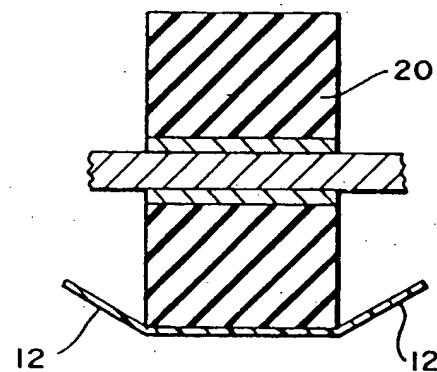


FIG. 3

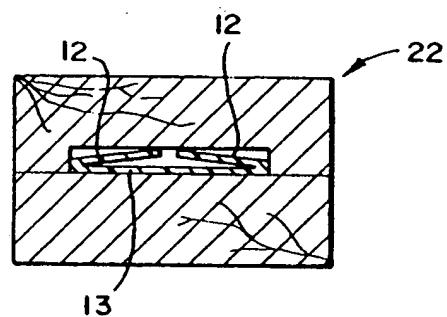


FIG. 4

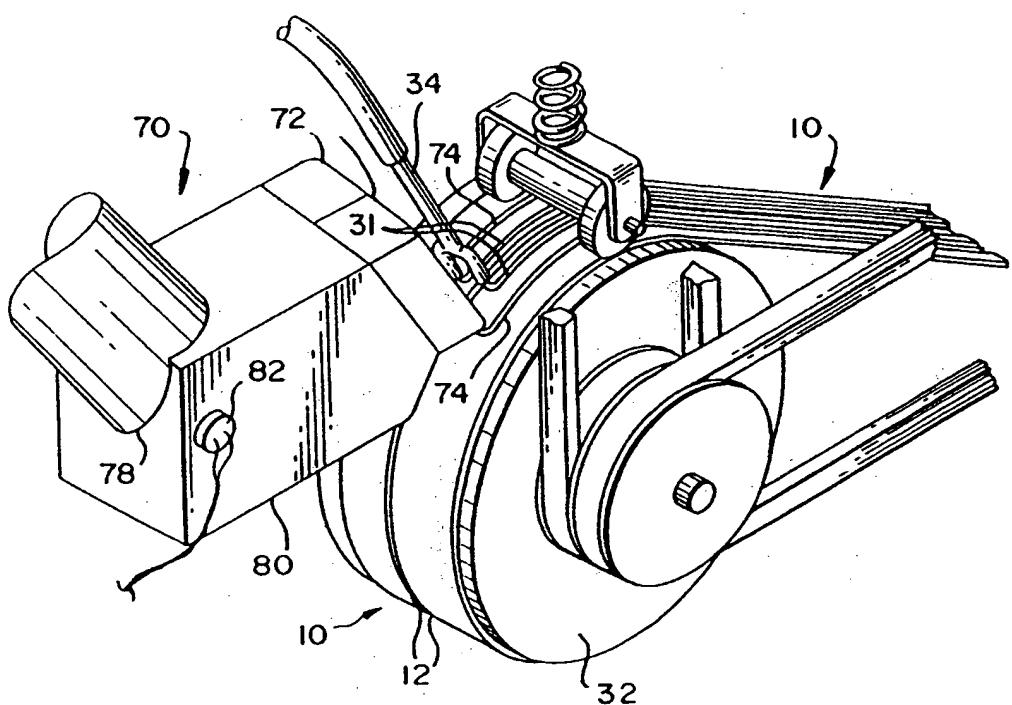


FIG. 5

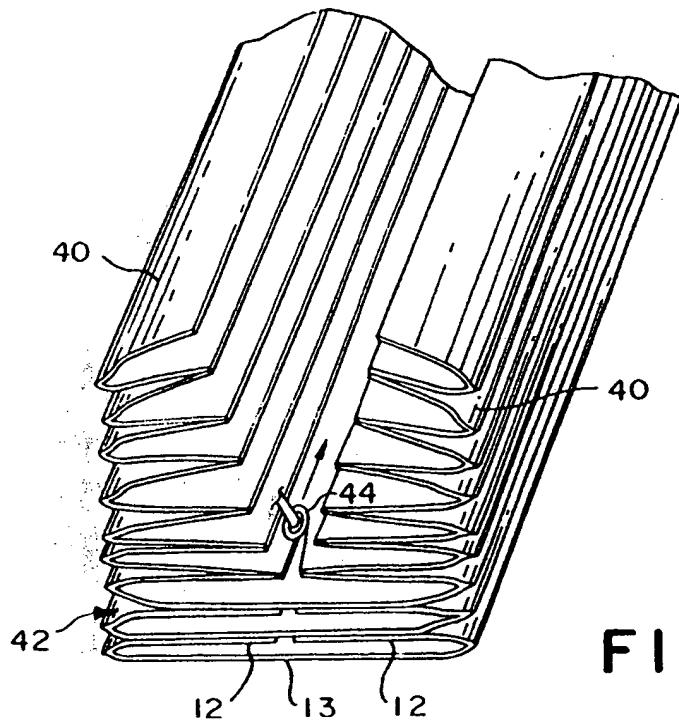


FIG. 6

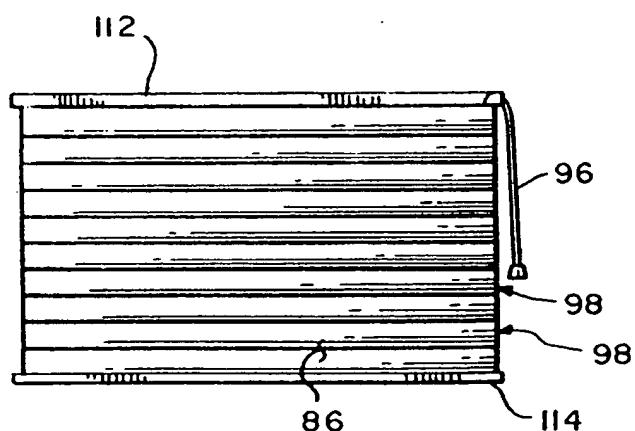
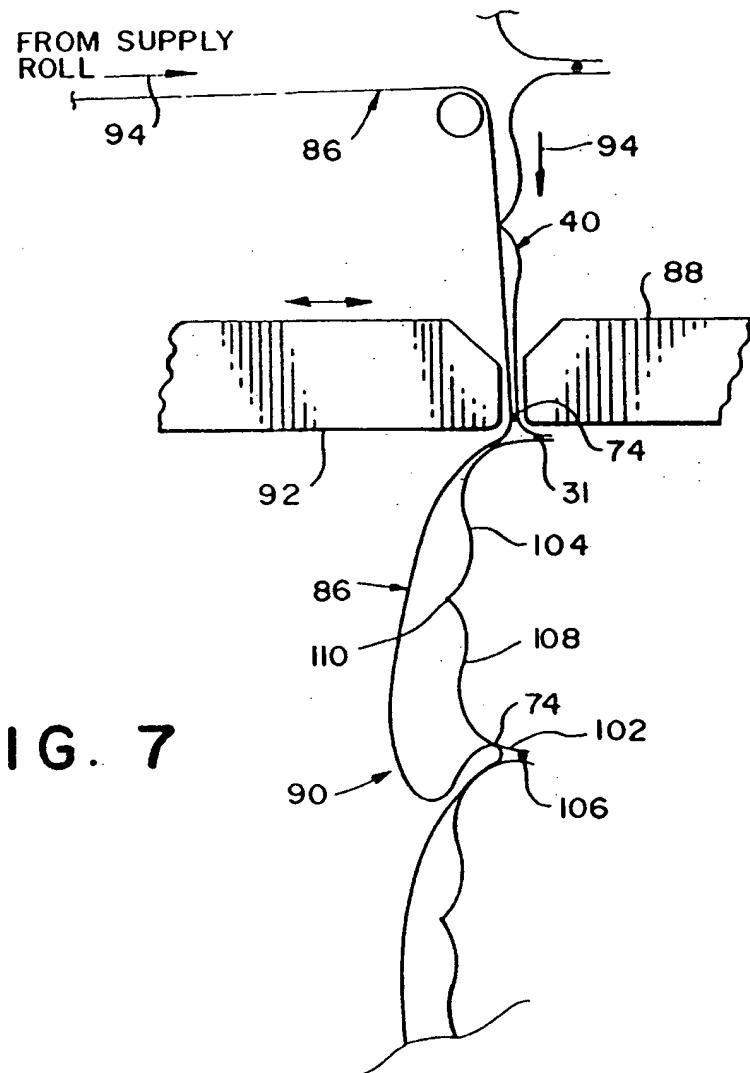


FIG. 8

